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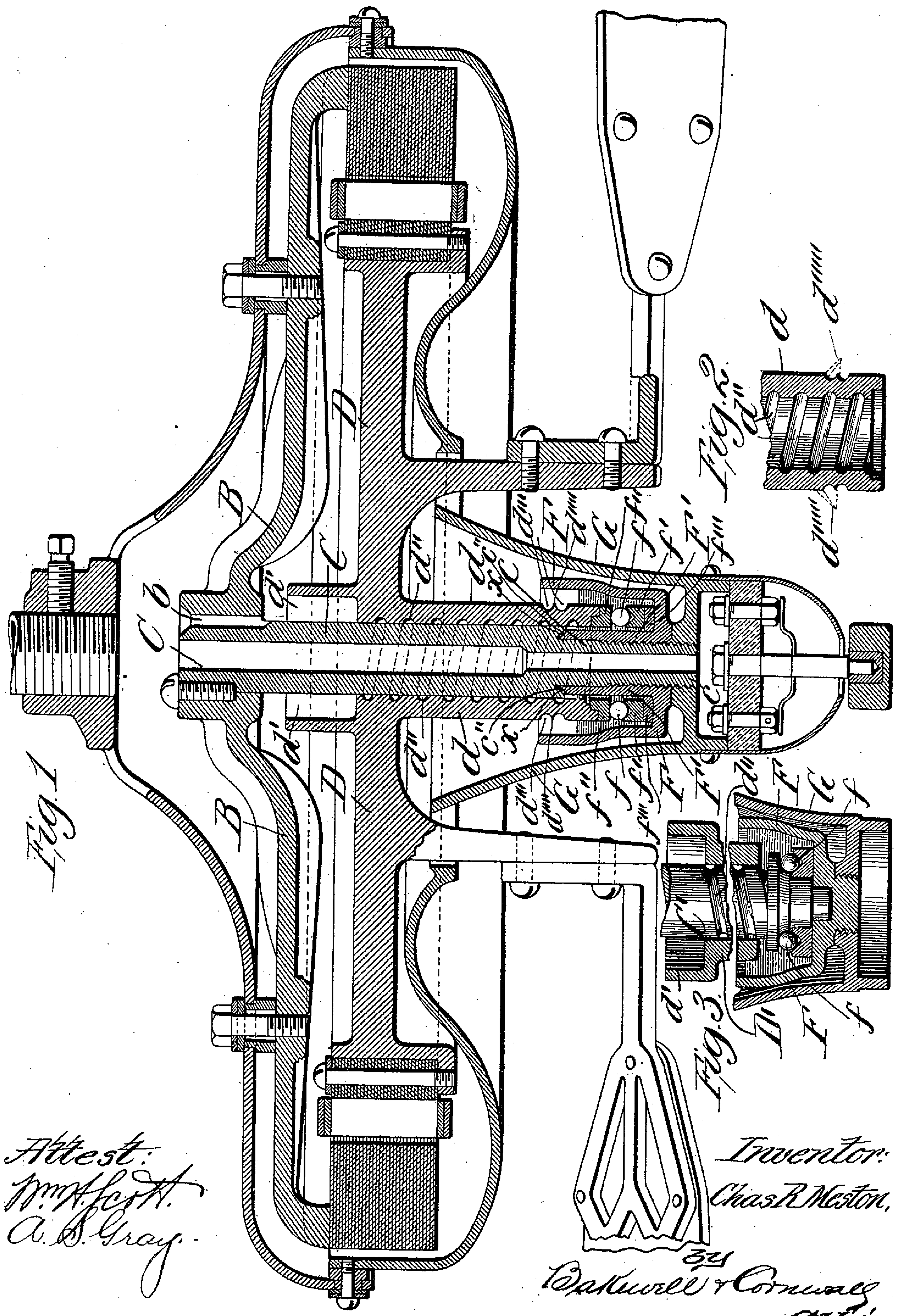
C. R. MESTON.

LUBRICATED BEARING.

(Application filed Nov. 28, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

CHARLES R. MESTON, OF ST. LOUIS, MISSOURI.

LUBRICATED BEARING.

SPECIFICATION forming part of Letters Patent No. 622,247, dated April 4, 1899.

Original application filed July 9, 1898, Serial No. 685,482. Divided and this application filed November 28, 1898. Serial No. 697,650. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. MESTON, a citizen of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Lubricated Bearings, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to a new and useful improvement in lubricated bearings designed particularly for use in connection with electric motors of that type commercially known as "ceiling-fan" motors, wherein the motor is suspended from the ceiling and the fan-blades are mounted directly upon the armature.

The objects of this present invention are to construct a bearing for the class of machinery described which will require little or no attention during the period it is designed to run, usually the summer season, and, further, to so construct said bearing that it will be constantly lubricated in a simple and efficient manner.

This present application is a division of an application filed July 9, 1898, Serial No. 685,482, which latter describes and claims in detail the electrical features of the motor, and therefore these form no part of this present application.

In the drawings, Figure 1 is a vertical sectional view through my improved lubricated bearings, showing the relation of the same to an electric motor. Fig. 2 is a detail view in section of the armature-sleeve or hollow shaft, showing the spiral groove contained therein; and Fig. 3 is a vertical sectional view of a modified form of lubricated bearings.

The essential features of this invention reside in providing a rotary element with a spiral groove, whose lower end opens into an oil-cup and whose upper end opens into a reservoir, whereby the rotation of said element in the proper direction forces the lubricant upwardly around the shaft on the principle of an Archimedean screw.

Other features of invention reside in the novel construction, arrangement, and combination of the several parts, all as will hereinafter be described and afterward pointed out in the claims.

Referring to Figs. 1 and 2, B indicates the motor-frame, in which is fixed a shaft C, which extends downwardly a suitable distance and upon which the armature-frame D is arranged. *d* is the extended bearing or hub portion of said armature-frame. The lower end *c* of shaft C is reduced in diameter somewhat and extends below the end of hub *d*, where it is provided with a suitable screw-thread designed to receive, first, an oil-cup F, which is secured thereon, and, second, an inverted-bell-shaped housing or guard G, designed to protect the oil-cup F and the bearings from dust, &c., as well as to prevent the oil from being thrown outwardly. Between the lower end of hub *d* and the upper face of the bottom of the oil-cup F is interposed an antifriction-bearing consisting of a series of hardened-steel balls *f*, which travel or rest upon an annular-shaped track or way *f'*, placed in the bottom of the oil-cup. The lower end of hub *d* is provided with a hardened-steel ring or bearing *f''*, which rests directly upon the steel balls.

Rising from the bottom of oil-cup F and inside of the series of the balls *f* and their bearings is a cylindrical portion F', in the internal lower portion of which is a screw-thread for engaging the shaft C, the upper end of said cylindrical portion F' being provided with a beveled edge or conical face, which is seated upon a gasket *x*, interposed between said conical face and a corresponding conical face *c''*, formed at the juncture of the shaft C with the reduced portion *c*. The internal diameter of hub *d* and the bearing-rings *f'* and *f''* are approximately the same, while the outside diameter of the cylindrical portion F' is somewhat smaller, thus leaving a sufficient clearance between such parts for the free circulation of oil.

The hub of the armature-frame D is provided upon its upper face with a reservoir *d'*, encircling the shaft C, and into this reservoir the upper end of a spiral groove *d''* terminates, while the lower end of said groove terminates at the lower end of hub *d*, said groove thus forming the continuous spiral channel around the shaft C from the lower or central portion of the oil-cup to the reservoir d'. When it is desired to supply the bearing with a lubricant, the reservoir d' is partially filled with oil, preferably through the hole b formed in the frame B. The lubricant when the motor is not running passes downwardly through the spiral groove d'', around shaft C, and into the oil-cup F. Enough oil should be supplied to wholly submerge the end of hub d, the balls, and their respective bearings. It will be seen that the rotation of the hub d, in which the spiral groove is formed, the pitch of said groove being in the proper direction, will force the oil up through the spiral groove, lubricating the shaft C, and that any overflow of said oil from the spiral groove will be received in the reservoir d'. When the rotary element is again in a position of rest, the lubricant will flow to the oil-cup F, as before described.

The spiral groove operates practically on the principle of an internal Archimedean screw, the cup F forming the source of supply from which the oil is drawn while the motor is running, the overflow or elevated oil being received in the reservoir d' in readiness to again return to cup F when the motor ceases to rotate or the speed is reduced so as to be insufficient to continue to force the oil upwardly or hold it in the reservoir. The pitch of the groove is also a factor with respect to the maintenance of the oil in the reservoir d'. The greater the pitch the higher will be the speed required to effect this result, while a lower speed is all that is necessary to cause the elevation of the oil where a slight pitch is employed. Of course it will be understood that the oil-elevating groove is pitched in one direction for a motor running in a certain direction and oppositely pitched for a motor running in a reverse direction.

It will be noticed that the lower end of the oil-elevating groove terminates some distance above the balls, so that at no time is it possible for the oil to be entirely taken away from said balls, the balls rather running while being submerged in oil.

In order to render the motor noiseless, I arrange a leather or other suitable washer f''' under the annular ball-ring f', which also to some extent cushions the armature.

As the oil has a tendency to climb the periphery of hub d when the armature is rotating, I provide means to interrupt and defeat said climbing before the oil reaches a point above the oil-cup. This is accomplished by two annular grooves d''', placed close together, between which is left an annular flange or pointed projection d''''. Should the oil pass the lower groove, it will be thrown off by centrifugal force back into the oil-cup. Instead of the two grooves d''' I may form an annular flange d''''', projecting beyond the periphery of the hub d, as shown by dotted lines in Fig. 2, which flange d''''' will perform the functions of the part d''''.

In Fig. 3 I have shown a modification of my invention in which the shaft C' rotates, while the bearing D' is stationary. The shaft, being the rotary element in this instance, is provided with a spiral groove performing the same function as groove d'', before mentioned. By this construction the oil is forced up by the rotating shaft into a reservoir arranged at the top of the bearing, whence it will fall by gravity back into the oil-cup when the shaft ceases rotating.

While I have shown in Figs. 1 and 2 a bearing especially adapted for an electric motor, it will be understood that there are many other uses to which my invention can be employed. I do not wish to be confined to the location of the spiral groove in a rotary element in the form of a sleeve, as shown in Figs. 1 and 2, as the principle of my invention is equally effective where the rotary element is in the form of a shaft and a groove cut therein.

I am aware that many minor changes in the construction, arrangement, and combination of the several parts of my motor can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a shaft C, having a reduced portion c, and an inclined shoulder c'', of an oil-cup formed with an upwardly-projecting hollow portion fitting the reduced portion of the shaft, the upper edge of said projecting portion of the oil-cup being beveled to coöperate with the inclined shoulder of the shaft, a hub, and a ball-bearing for the hub located in the oil-cup; substantially as described.

2. The combination with a shaft C, provided with an inclined shoulder and a reduced portion at its lower end, of an oil-cup secured on the lower end of said shaft and provided with a central hollow portion for receiving the reduced end of the fixed shaft, a leather, or other suitable, washer arranged in the bottom of the oil-cup, an annular grooved ring on the washer, balls on said ring, and a hub supported by said balls; substantially as described.

3. The combination with a rotary element having a spiral groove, an oil-cup into which the lower end of said spiral groove opens, and a reservoir into which the upper end of said spiral groove leads for receiving and retaining the oil at a point above the oil-cup, while the rotary element is operating; substantially as described.

4. The combination with a rotary element, formed with a spiral groove, of an oil-cup into which the lower end of said spiral groove opens, a reservoir into which the upper end of said spiral groove leads for receiving and retaining the oil at a point above the oil-cup, while the rotary element is operating, and means on said rotary element for prevent-

ing the oil in the oil-cup from climbing the periphery of the same; substantially as described.

5. The combination with a fixed shaft, of a hub mounted thereon, a reservoir formed at the upper end of the hub for receiving and retaining the oil at a point above the oil-cup, while the rotary element is operating, an oil-cup surrounding the lower end of the hub, and there being an internal spiral groove formed in the hub, whereby, when said hub is rotated, lubricant is forced upwardly around the shaft and into the reservoir; substantially as described.

6. The combination with a fixed shaft, a rotating hub mounted thereon, a reservoir arranged on top of said hub, an oil-cup arranged at the bottom of the hub, there being an internal spiral groove in the hub for elevating the oil from the oil-cup to the reservoir when the hub is rotating, said groove, also, permitting the oil to pass from the reservoir to the oil-cup when the hub is not rotating, and a ball-bearing for said hub located below the lowest oil-line of the oil-cup; substantially as described.

7. The combination with a rotary element formed with a spiral groove, of an oil-cup into which the lower end of said spiral groove opens, a reservoir into which the upper end of said spiral groove leads, and a ball-bearing for said rotary element, which ball-bearing is arranged in the oil-cup and under the oil-line thereof; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 23d day of November, 1898.

CHARLES R. MESTON.

Witnesses:
F. R. CORNWALL,
A. S. GRAY.